Claims

1. A high-efficiency LED-based illumination system with improved color rendering, simultaneously exploiting the color-mixing principle of blue, green and red (RGB mixing) and the principle of converting a primary radiation emitted by an LED into light with a longer wavelength by means of a phosphor which at least partially absorbs this radiation, at least two LEDs being used, of which a first LED emits primarily in the range from 340 nm to 470 nm (peak wavelength), in particular at least 420 nm, and a second LED emits in the red region at 600 to 700 nm (peak wavelength), characterized in that the green component is produced by the primary radiation of the first LED being at least partially converted by a green-emitting phosphor, the green-emitting phosphor used being a phosphor from the class of the oxynitridosilicates, having a cation M and the empirical formula $M_{(1-c)}Si_2O_2N_2:D_c$, where M comprises Sr as a constituent and M = Sr alone or M = $Sr_{(1-x-y)}Ba_yCa_x$ with $0 \leq x+y < 0.5$ being used, and the oxynitridosilicate completely or predominantly comprising the high-temperature-stable modification HT.

2. The illumination system as claimed in claim 1, characterized in that the system contains groups of LEDs of the same type.

3. The illumination system as claimed in claim 1, characterized in that three LEDs or groups of LEDs are used, the primary radiation of the first LED being completely converted into green secondary emission, with a third LED emitting blue light, in particular with a peak wavelength in the range from 430 to 470 nm.

4. The illumination system as claimed in claim 1, characterized in that the system includes control electronics which impart dimmability or targeted controllability of properties of the system, such as the luminous color.

5. The illumination system as claimed in claim 3, characterized in that the system includes control electronics which control the brightness of the individual LEDs or groups of LEDs individually, so that a tunable illumination system is formed for a range of color temperatures which covers at least 1000 K within a band from 2500 to

5000 K, with an Ra of at least 85, in particular at least 90, for each selected color temperature within the selected range.

6. The illumination system as claimed in claim 1, characterized in that precisely two LEDs or groups of LEDs are used, the primary radiation of the first LED being only partially converted into green secondary emission, in which case both the green component and the blue component are emitted by the first LED.

7. The illumination system as claimed in claim 1, characterized in that the green secondary emission has a dominant wavelength in the range from 550 to 570 nm.

8. The illumination system as claimed in claim 1, characterized in that in the oxynitridosilicate the Eu fraction makes up between 0.1 and 20 mol% of M.

9. The illumination system as claimed in claim 1, characterized in that Sr represents the majority of M and a proportion of M, in particular up to 30 mol%, is replaced by Ba and/or Ca.

10. The illumination system as claimed in claim 1, characterized in that a proportion of M, in particular up to 30 mol%, is replaced by Li and/or La and/or Zn and/or Na and/or Y.

11. The illumination system as claimed in claim 1, characterized in that part of the group SiN in the oxynitridosilicate of formula $MSi_2O_2N_2$, in particular up to 30 mol%, is replaced by the group AlO.

12. The illumination system as claimed in claim 1, characterized in that a proportion of Eu, in particular up to 30 mol%, is replaced by Mn.

13. The illumination system as claimed in claim 1, characterized in that the primary radiation source used is a light-emitting diode based on InGaN with a peak wavelength in the range from 420 to 470 nm, in particular with its peak wavelength in the range from 440 to 465 nm.

14. The illumination system as claimed in claim 1, characterized in that the color mixing using the RGB principle realizes a white-emitting illumination system with a color temperature of from 2500 to 5000 K, in particular 3500 to 5000 K.

15. The illumination system as claimed in claim 1, characterized in that a plurality of light-emitting components are arranged in a cavity, in particular a luminescence conversion LED which imparts blue and green components of the emission simultaneously and an LED which imparts red components of the emission directly.

16. The illumination system as claimed in claim 1, characterized in that the full width at half maximum of the oxynitridosilicate is less than 90 nm, preferably less than 80 nm.

17. The illumination system as claimed in claim 1, characterized in that the system includes electronics for actuating individual LEDs or groups of LEDs.